

Bay Engineering Inc.
Engineers, Planners and Surveyors



February 20, 2013

City of Annapolis
Neighborhood and Environmental Programs
160 Duke of Gloucester Street
Annapolis, MD 21401

Attn: Frank Biba

**Re: THE RESERVE AT ANNAPOLIS STATION
ANNAPOLIS, MD 21401
FOREST STAND DELINEATION
RESPONSE TO COMMENTS**

Dear Mr. Biba:

The following is a point-by-point response to the comments generated in a letter dated January 10, 2013. We have organized the comments (copy attached) and our respective responses as follows:

- Response 1:** We acknowledge your comment. The FSD report has been modified to show stands A, B, C and D as high priority stands. It is noted that proposed development is not precluded by regulations (see Natural Resources Article, Section 5-1607(c)(1)).
- Response 2:** A written narrative analyzing all of the field data for stands A-D as per the FCA Manual requirements has been added to the revised FSD report.

I trust that our responses and plans will be forwarded to the appropriate agencies for review and approval of this formal FSD resubmittal. If you should have any questions or comments, please do not hesitate to contact me.

Thank you for your efforts in this regard.

Sincerely,
BAY ENGINEERING, INC.

Terry L. Schuman, P.E.

cc: Tom Smith
George Bailey
Alan Hyatt
Mike Klebasco

E:\10-3572 Bayco Property Annapolis\Correspondence\PL by PE Responses\040413\2-20-13.doc



City of Annapolis

DEPARTMENT OF NEIGHBORHOOD & ENVIRONMENTAL PROGRAMS

160 Duke of Gloucester Street, Room 202, Annapolis, Maryland 21401

Annapolis 410-263-7946 • FAX 410-263-9158 • TDD 410-263-7943 • www.annapolis.gov

Main Branch
DIRECTOR

January 10, 2013

To: Terry Schuman, P. E.
Bay Engineering, Inc.

From: Frank Biba, AICP, LEED AP
Chief, Environmental Programs

RE: Review of the December 13, 2012 Forest Stand Delineation Plan/Comments (FSD), The Reserve at Annapolis Station

1. Both the Annotated Code of Maryland (Natural Resources Article, Title 5, Forest and Parks, Subtitle 16, Forest Conservation) in section 5-1607 (c) 1 (ii) and the State Forest Conservation Technical Manual (Third Edition, 1997) on page B-1 define contiguous forest as "a forest which connects the largest undeveloped or most vegetated tracts of land within and adjacent to a site." No specific size is indicated in the definition for contiguous forest, notwithstanding the Forest Conservation Technical Manual references to minimum forest acreage and width (3.1.1) which are for guidance only, and are not incorporated into the Natural Resources Article.

City staff is applying the Forest Conservation Act to The Reserve at Annapolis Station project consistent with the Natural Resources Article (Title 5, subtitle 16) and is consistent with the way City staff has applied the Act to previous projects.

Since stand A, B, C and D are part of a contiguous forest they automatically are considered priority one stands.

Although identified as contiguous forest, proposed development is not precluded by regulation (see Natural Resources Article, sec. 5-1607 (c) (1)).

2. Page 4/5, Stand Descriptions: the FCA Manual, on pages 2-18 through 2-22, requires that the FSD field data be analyzed and summarized in a written narrative. The October 31, 2012 FSD report only provides the field data and a short summary of the field data for stands A through D. Please provide for all stands a written narrative analyzing the field data as per FCA Manual requirements. Please focus in the narrative particularly on the regeneration potential of the stand, site hydrology, the potential of the stand or parts of a stand to recover from natural and development disturbances, and other factors, as appropriate.



City of Annapolis

Department of Neighborhood & Environmental Programs
160 Duke of Gloucester Street
Annapolis, MD 21401-2517

DNEP@annapolis.gov • 410-263-7946 • Fax 410-263-9158 • www.annapolis.gov
Deaf, hard of hearing or speech disability - use MD Relay or 711

Revision Submittals

This form must accompany all submittals of revised plans.

You are required to submit five copies (six if commercial) of both the original and revised plans.

Job location address Dorsey Drive and Tyding Drive
Submitted by Bay Engineering, Inc.
Phone 410-897-9290 Date 2/21/13

Attachments (please check one)

Permit # _____

☒ Revisions to a permit currently being processed _____
☐ Revisions to a permit already issued _____ Issue date _____
☐ Additional plans for permit currently being processed _____

Describe changes from original submission. Unless all pages have been revised, include page numbers containing revisions. Drawing changes should be "bubbled," highlighted or indicated in some way.

Forest Stand Delineation revisions requested
by Frank Biba.

Total cost of changes _____

☐ Revisions requested by applicant
☒ Revisions requested by City - Department/Employee Frank Biba

Signature [Signature] Date 2/21/13

**Submittal of revised plans will incur a fee as referenced below per City Code Section 17.12.052.
The fee is collected upon submittal.**

Construction Cost	Revised Plan Fee
0 TO \$10,000	\$60.00
\$10,001 TO \$15,000	115.00
\$15,001 TO \$25,000	175.00
\$25,001 TO \$100,000	280.00
\$100,001 and over is 0.1% of total cost over \$100,000 plus	280.00

At option of Director, fee to submit revised Construction drawings and submittals for outside review is \$100 plus an hourly fee of (amounts are chargeable in quarter hour increments.)

FOREST STAND DELINEATION REPORT

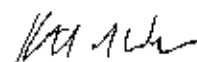
for

**The Reserve at Annapolis Station
City of Annapolis, Maryland
[Revised]**

Prepared for:

**Bay Engineering, Inc.
190 Admiral Cochrane Drive, Suite 175
Annapolis, Maryland 21401**

Prepared by:



2-6-13

Kenneth R. Wallis

Date

 **Klebasko
Environmental, LLC**
8373 Piney Orchard Parkway, Suite 207
Odenton, Maryland 21113
Phone: (410) 672-5990
FAX: (410) 672-5993

1. INTRODUCTION

This report is prepared in accordance with the requirements outlined in the Maryland Department of Natural Resources' *State Forest Conservation Technical Manual*¹, as well as the City of Annapolis' guidelines. According to the *State Forest Conservation Manual*, the purpose of a Forest Stand Delineation (FSD) is to determine the most suitable and practical areas for forest conservation during the preliminary design and review stages of development. The preparer of this report, Kenneth R. Wallis, is a qualified professional under COMAR 08.19.06.01, and the field study was conducted on May 14, 15, 17, 22, June 21 and October 18, 2012.

2. SITE LOCATION AND CONDITIONS

The 7.65 acre Hayes Property (study area) is located northeast of the existing terminus of Dorsey Road, in the City of Annapolis, Maryland (Figure 1). The study area is bordered to the north and south by existing residential properties and to the east by an unnamed tributary to Church Creek. The site is currently comprised of fallow agricultural fields and mixed-hardwood forest, of which 4.46 acres qualify as forest for purposes of the Forest Stand Delineation (FSD).

3. SOILS

The U.S. Department of Agriculture - Natural Resources Conservation Service (NRCS) has produced soil surveys for every county within the State of Maryland. The soil surveys map the locations of the various soil types throughout each county and provide a description of each soil type. The updated soil survey for Anne Arundel County (Figure 2) that can be accessed on-line at <http://websoilsurvey.nrcs.usda.gov> revealed that four (4) soil types are mapped within the study area. None of the soil types have been classified as hydric by NRCS, however the Annapolis fine sandy loam (AsE) and Widewater and Issac soils (WBA) may potentially contain hydric inclusions. The soil descriptions are listed in Table 1, along with the erodibility factors for each. Soils are considered highly erodible if the K-factor exceeds 0.35.

4. STEEP SLOPES

According to section 17.04.830 of the City Code, a steep slope is defined as a slope of greater than 15 percent grade. Steep Slopes do exist on the site and are demarcated on the attached FSD Plan.

5. RARE, THREATENED & ENDANGERED SPECIES

A formal request for an environmental review of rare, threatened or endangered species was submitted to the Maryland Department of Natural Resources (DNR), Wildlife and Heritage Division. A copy of DNR's response letter, dated June 27, 2012, can be found in Appendix A of this report. No threatened or endangered species were observed during completion of the forest stand delineation field studies.

¹ Maryland Department of Natural Resources. 1997. *State Forest Conservation Technical Manual - 3rd Edition*. Baltimore, Maryland.

6. WETLANDS, STREAMS & 100-YEAR FLOODPLAIN

The limits of jurisdictional waters of the U.S. (including wetlands) were delineated by Michael J. Klebasko and Kenneth R. Wallis of Klebasko Environmental, LLC. in May 2012. A forested wetland/stream system was identified at the toe of the steep slopes along the eastern property boundary. This wetland/stream system drains into Church Creek, a tributary of the South River. There is no 100-year floodplain associated with this stream system.

7. METHODOLOGY

Forests are defined in the Forest Conservation Act (Nat. Res. Act. 5-1601) as a biological community dominated by trees and other woody plants covering a land area of 10,000 square feet or more, having a minimum density of at least 100 trees per acre with a minimum of 50% of those trees having diameters at least 2 inches at breast height. Forest also includes areas in which the trees have been cut but not cleared of their stumps.

Prior to conducting the field study, a base map was created by overlaying known environmental features (i.e. wetlands, streams, mapped soil types) and existing site conditions (i.e. tree-line, topography, structures) onto the map. The base map was then used to determine possible forest stand boundaries and to establish a sampling strategy for the site. The manual requires a minimum of one 1/10 acre sample plot per 4 acres of forest stand area; a minimum of two plots per forest stand; and a minimum of three plots for the total forested area of the site.

A Billmore Stick was used to determine the size of trees generally less than 28-inches in diameter, while a 50-foot retractable D-tape was used to measure the larger trees. A Basal Area 10 Factor prism was used to collect information on tree densities at each sample point. For this study, seven (7) data point locations were used to collect the required field data. Their locations are indicated on the FSD Plan and each data point was marked in the forest with red ribbon and numbered.

Data collected at each sampling point and noted on the attached Forest Stand Delineation Field Sampling Data Sheets included such information as basal area, percent canopy closure, percent invasive species cover, shrub and herbaceous species, and percent downed woody debris. In addition, any specimen trees (trees with diameters-at-breast height greater than 30 inches) or trees with diameters within 75% of a State Champion were also flagged and their locations demarcated on the FSD Plan.

The information collected in the field was then used to calculate a structure value for each forest stand. The structure value places each forest stand in one of three categories: Poor, Good and Priority. This data aids in determining the overall value of each forest stand.

8. STAND DESCRIPTIONS

The forest stand delineation field study revealed that the existing forest on the site can be divided into four (4) stands based on age and/or species composition.

Stand A

Stand Composition and Structure

Stand A (3.24 acres) is a mature, mixed-hardwood forest occupying the steep slopes along the eastern side of the property. The canopy is generally dominated by white oak (*Quercus alba*), chestnut oak (*Quercus prinus*) and yellow poplar (*Liriodendron tulipifera*). This stand has an average diameter-at-breast height (DBH) of 22 inches (Appendix B) and contains numerous specimen trees. The shrub and herbaceous layers are generally dominated by highbush blueberry (*Vaccinium corymbosum*), spicebush (*Lindera benzoin*), mockernut hickory (*Carya tomentosa*), bittersweet (*Celastrus scandens*), false solomon's seal (*Smilacina racemosa*), and early low blueberry (*Vaccinium vacillans*). Twelve (12) tree species, identified on the attached Field Sampling Data Sheets (Appendix B), were tallied by 2 data points. The Forest Structure Analysis Sheet indicates that this stand has a structure value of 16, which puts it in the "Priority" rating. This stand has a well developed structural diversity due to the age of the stand. Some invasive plant species, including bittersweet and Japanese honeysuckle (*Lonicera japonica*), are creeping into this stand from adjacent stands to the west.

This stand has good structural diversity within the canopy, shrub and herbaceous layers. The canopy has an average closure of 97 percent. The shrub layer contains numerous stems and species which vary in composition and density throughout the stand. The herbaceous layer contains numerous native species and only a few invasive species. Certain individual trees within this stand, which are in fair to poor health, will not be able to withstand the development stresses. Management methods for any trees in good or better condition could include: root pruning, crown pruning, root aeration systems, and fertilization depending on the tree. Disturbances within this stand will provide opportunities for younger trees to regenerate within the disturbed areas. Portions of Stand A, immediately adjacent to Stands B and D, contain invasive species, which do not appear to be taking over the stand. Stand A has a well-defined stand structure which should not be adversely affected by disturbance and stress.

Stand Condition

The regenerative potential of this stand is high since the stand is comprised of a mature hardwood forest. Most of the tree species (oaks) are at the age where they now produce seed crops which provide regenerative potential within the soil. Stand hydrology is fairly dry since it is situated on the side of a steep slope. The stand generally drains in an easterly direction into a wetland stream system at the base of the slope. Stand A is a fairly healthy stand and has good potential for recovering after development related disturbance. Many of the trees are larger, but with careful planning it can be determined which trees should be retained and which should be removed along the project clearing limits. There is some evidence of fungi within the stand, but it only occurs in a few trees and is not a major factor to the stands overall health. It is unlikely that the minor disease and pest problems which currently exist within this stand would be exacerbated by proposed development stresses.

Stand A has a high priority for retention and protection because of the presence of numerous specimen trees and steep slopes.

Stand Function

The structural diversity of Stand A provides suitable wildlife habitat for forest dwelling species. As compared to urban or farmland, Stand A has value for water quality protection. In addition, Stand A offers an aesthetic benefit as a forested area and, at certain locations, offers the potential for passive recreation. Given its urban setting, Stand A has no value as an area for timber production. Stand A is generally healthy and regenerating naturally. This stand is adjacent to sensitive areas and provides buffering to surface runoff.

It is likely that numerous wildlife species frequently use this stand. Because it is contiguous with a larger tract of riparian forest, Stand A provides benefits as a wildlife corridor.

Stand B

Stand Composition and Structure

Stand B, which totals 0.46 acres, is an early successional, mixed-hardwood forest dominated by yellow poplar and black cherry (*Prunus serotina*). This stand has an average DBH of 13 inches (Appendix C), and relatively dense shrub and herbaceous layers comprised of poison-ivy (*Toxicodendron radicans*), bittersweet, Japanese honeysuckle, and English ivy (*Hedera helix*). This stand contains approximately 45% invasive species cover likely due in part to past human disturbance. In addition to the relatively high percentage of invasive species cover, significant amounts of trash and other debris have been spread throughout much of the stand. Since this stand is immature, it will be least likely affected by disturbance. Invasive species are already scattered throughout the stand; therefore, any reforestation completed in or near this stand will need to have large enough trees to outgrow the invasive species. Controlling the invasives with herbicides may be necessary in some areas. The Forest Structure Analysis Sheet indicates that this stand has a structure value of 16, which puts it in the "Priority" rating. However, Stand B contains extensive invasive plant cover, lacks maturity, and contains large amounts of refuse. Normally it would be classified as a low priority for retention. However, at the direction of the City of Annapolis, this stand is being considered a high priority for retention solely for the fact that it is contiguous to a larger forested tract.

Stand Condition

Stand B has reached the age where some structural diversity is occurring. The basal area of the stand is 130 and there are approximately 841 trees per acre. There is not much noteworthy about this stand with the exception of the high number of invasive plant species. As a result this stand has low potential. There was no insect damage, fungal or disease problems detected within this stand.

Stand Function

The lack of structural diversity in addition to the young age of the stand leads Stand B currently to be considered of lower value as wildlife habitat. Like Stand A, Stand B has value for water quality protection. In addition, Stand B does offer an aesthetic benefit as a forested area and, as the stand matures and diversifies, offers the potential for passive recreation. Stand B does provide a buffering function to surface runoff and also provides some nutrient uptake functions. Some wildlife species

likely utilize this stand as well. The stand is comprised of two areas which border east side of the fallow field on the property, both of which are part of and are adjacent to a forest corridor. Typically, this stand would be a low priority for retention. However, at the direction of the City of Annapolis this stand is being considered a high priority for retention solely for the fact that it is adjacent to other contiguous forest.

Stand C

Stand Composition and Structure

Stand C (0.60 acres) is a bottomland mixed-hardwood forest occupying the valley along the eastern edge of the property. The stand is generally dominated by yellow poplar and red maple (*Acer rubrum*), but does contain numerous sweetgum and American sycamore (*Platanus occidentalis*) trees. This stand has an average DBH of 21 inches (Appendix D). The shrub and herbaceous layers are dominated by spicbush, skunk cabbage (*Symplocarpus foetidus*), common greenbrier (*Smilax rotundifolia*), and poison ivy. The Forest Structure Analysis Sheet indicates that this stand has a structure value of 1.5, which puts it at the upper end of the "Good" rating. Because Stand C is almost entirely comprised of non-tidal wetlands and contains an intermittent stream, this stand has a high priority for retention.

This stand has a good structural diversity, shrub and herbaceous layers. This is a mature stand with a canopy closure of 78 percent. The shrub and herbaceous layers are relatively dense due to the nontidal wetlands which exist within the stand. There are very few invasive plant species within this stand.

Development stresses should not be an issue for this stand since it is comprised almost entirely of non-tidal wetlands and streams and will likely have very little proposed development impacts. Any disturbance would likely have minimal impact provided that the existing hydrologic regime is not significantly altered.

Stand Condition

The regenerative potential of this stand is medium since the stand is comprised of a hardwood forest with a closed canopy. This stand is fairly healthy and has a good potential for recovering after development-related disturbances. There are few invasive species within this stand and no evidence of any fungal or pest problems.

Stand Function

Hydrology is a critical element within this stand and a major factor that affects plant diversity. This stand contains the most sensitive areas (i.e. waters of the U.S. and non-tidal wetlands) on the site and is a priority area for retention and protection.

Stand C has a relatively good structural diversity of canopy, shrub and herbaceous layers. Stand C has value for water quality protection and it does offer an aesthetic benefit as a forested area. Stand C has little value as an area for timber production. As with many forest stands there is increasing organic

matter within the soils. This stand will likely be the recipient of any soil erosion or sediment losses from the uplands.

Stand D

Stand Composition and Structure

Stand D, which totals 0.16 acres, is a mixed-hardwood forest dominated by yellow poplar. This stand has an average DBH of 11 inches (Appendix E), contains a relatively sparse shrub layer, but contains the same invasive species as those in occur in Stand B; poison-ivy, bittersweet, Japanese honeysuckle, and English ivy. This stand contains approximately 40% invasive species cover likely due in part to past human disturbance. In addition to the relatively high percentage of invasive species cover, trash and other debris have been spread throughout portions of the stand. This stand has a moderate structural diversity of canopy, shrub and herbaceous layers and an average canopy closure of 90%. Due to the relatively small size of the stand only one data point could be completed within the stand. The Forest Structure Analysis Sheet indicates that this stand has a structure value of 11, which puts it in the "Good" rating. Because Stand D contains extensive invasive plant cover and a fair amount of refuse, it normally would be classified as a low priority for retention. However, at the direction of the City of Annapolis, this stand is being considered a high priority for retention solely for the fact that it is contiguous to a larger forested tract.

Stand Condition

This stand will be susceptible to development stresses because mature yellow poplars do not withstand critical root zone disturbances very well. Because this stand has a significant percentage of invasive species, potential regeneration would be moderate. The regenerative potential of this stand is moderate since many of the trees are at the age where they now produce seed crops which provide regenerative potential within the soil. This stand is not dependent on saturated conditions like Stand C and is therefore fairly dry. Many of the trees within this stand have multi-stemmed trunks and do not have good form. There was no evidence of fungi or pest problems within this small stand, but numerous exotic and invasive plant species do exist within the stand.

Stand Function

The fair structural diversity of Stand D suggests that it may provide some wildlife habitat for forest dwelling species. Due to its location between two other stands it is likely that wildlife species frequent this stand. As compared to urban or farmland, Stand D has value for water quality protection. This stand does provide a buffering function to the sensitive areas located in the valley to the east. In addition, Stand D offers a minimal aesthetic benefit as a forested area and could offer the potential for passive recreation. Given its urban setting, Stand D has little value as an area for timber production.

TABLE 1

Mapped Soil Types

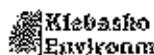
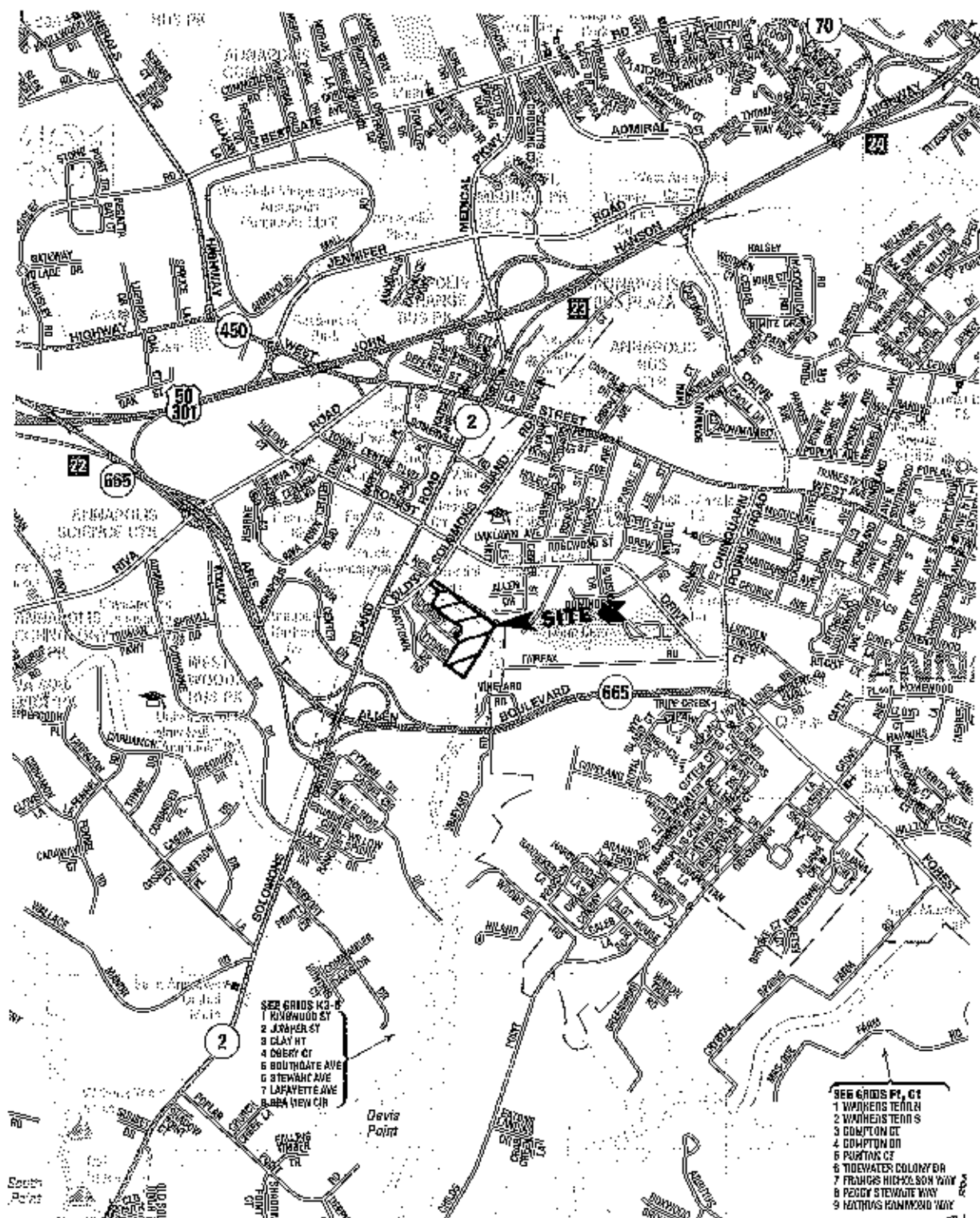
<i>Map Unit</i>	<i>Description</i>	<i>Hydric</i>	<i>K-Factor</i>
AsE	Annapolis Fine Sandy Loam, 15-25% slopes	Partially	0.28
AuB	Annapolis-Urban Land Complex, 0-5% slopes	No	0.28
CoB	Collington-Wist complex, 2-5% slopes	No	0.32
WBA	Widewater and Issue soils, 0-2% slopes, frequently flooded	Partially	0.28

Source: <http://websoilsurvey.nrcs.usda.gov> (June 2012)

TABLE 2

Key to Abbreviations for the Forest Species

<i>Abbreviation</i>	<i>Common Name</i>	<i>Species Name</i>
Aa	tree-of-heaven	<i>Ailanthus altissima</i>
Ar	red maple	<i>Acer rubrum</i>
Cc	hornbeam	<i>Carpinus caroliniana</i>
Ct	mockernut hickory	<i>Carya tomentosa</i>
Fa	white ash	<i>Fraxinus americana</i>
Ls	sweetgum	<i>Liquidambar styraciflua</i>
Ll	yellow poplar	<i>Liriodendron tulipifera</i>
Jn	black walnut	<i>Juglans nigra</i>
Ns	black gum	<i>Nyssa sylvatica</i>
Ps	black cherry	<i>Prunus serotina</i>
Pa	sweet cherry	<i>Prunus avium</i>
Po	American sycamore	<i>Platanus occidentalis</i>
Qa	white oak	<i>Quercus alba</i>
Qc	scarlet oak	<i>Quercus coccinea</i>
Qf	southern red oak	<i>Quercus falcata</i>
Qph	willow oak	<i>Quercus phellos</i>
Qm	chestnut oak	<i>Quercus prinus</i>
Qr	northern red oak	<i>Quercus rubra</i>



**Kiebasco
Environmental, LLC**
8373 Pincey Orchard Parkway, #207
Odenton, Maryland 21113
(410) 672-5990 (office)
(410) 672-5993 (fax)

The Reserve at Annapolis Station City of Annapolis, MD

FIGURE 1 - Vicinity Map
(Copyright ADC The Map People
Permitted Use #21005228)

Scale: 1" = 2,000'

APPENDIX A



MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governor
Anthony E. Brown, Lt. Governor
John R. Griffin, Secretary
Joseph P. Gitt, Deputy Secretary

June 27, 2012

Kenneth Wallis
Klebasko Environmental LLC
8373 Piney Orchard Parkway, Suite 207
Odenton, MD 21113

RE: Environmental Review for Hayes Property, north of Dorsey Rd. in Annapolis, Anne Arundel County, MD.

Dear Mr. Wallis:

The Wildlife and Heritage Service has determined that there are no State or Federal records for rare, threatened or endangered species within the boundaries of the project site as delineated. As a result, we have no specific comments or requirements pertaining to protection measures at this time. This statement should not be interpreted however as meaning that rare, threatened or endangered species are not in fact present. If appropriate habitat is available, certain species could be present without documentation because adequate surveys have not been conducted.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2012.0864.aa

APPENDIX B

FOREST STAND SUMMARY

Forest Stand:	A	<u>% Dominance By Species For Stand A</u>		
Acreage:	3.24	<u>Species</u>	<u># Tallied</u>	<u>% Dominance</u>
Data Points/Stand:	2	Qm	5	19%
Average DBH:	22	Qr	1	4%
Number of Trees/Acre:	179	Qa	5	19%
Number of Tree Species:	12	Lt	5	19%
Basal Area/Acre:	135	Ct	3	12%
Number of Dead Trees/Acre:	0	Ls	1	4%
Number of Shrubs per Acre:	1150	Ar	1	4%
% Canopy Cover:	97	Po	1	4%
% Herbaceous Cover:	75	Cc	1	4%
% Downed Woody Material:	1	Qc	2	8%
% Exotic or Invasive Species:	30	Fa	1	4%
		Jh	1	4%
		Total	26	100%

FOREST STRUCTURE ANALYSIS

(As an average per acre for the stand)

<u>Stand Designation</u>	<u>A</u>	<u>Structure Value</u>	<u>16</u>
---------------------------------	-----------------	-------------------------------	------------------

The following parameters comprise an average of data collected at each point for the stand indicated above. The parameters, when combined, give a general representation of the condition and value of the stand.

The total structure value is defined by:

15-21 Priority

7-14 Good

0-6 Poor

<u>Percent Canopy Closure</u>		<u>Size Class of Dominant Trees</u>	
70-100%	3	Greater than 20"	3
40-69%	0	6-19.9"	0
10-39%	0	3-5.9"	0
0-9%	0	Less than 3"	0
<u>Number of Shrubs per Acre</u>		<u>Percent Herbaceous Cover</u>	
600 or more	3	75-100%	3
400-599	0	25-74%	0
200-399	0	5-24%	0
0-199	0	0-4%	0
<u>Percent Woody Debris</u>		<u># of Tree Species >=6"</u>	
15-100%	0	6 or more	3
5-14%	0	4-5	0
1-4%	1	2-3	0
Less than 1%	0	0-1	0
<u># Standing Snags per Acre</u>			
30 or more	0		
20-29	0		
10-19	0		
0-9	0		

Forest Stand Delineation
Field Sampling Data Sheet

Property: The Reserve at Annapolis Station Prepared by: K. Wallis

Stand: A Sample Point: B Date: 5-27-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	0
Qc	23, 26		
Lt	36, 31, 36, 25	Percent canopy cover at sample point	95
Ct	11, 9		
Fa	22	Percent herbaceous cover at 1/100th acre plot	80
Sn	20		
Qc	21, 35, 16	Percent downed woody debris ≥6" diameter at 1/10th acre plot	1
Qm	26		
		Percent invasive plant cover at 1/100th acre plot	55
		Number of shrubs per 1/100th acre plot	13

Invasive Species:

Lonicera japonica *Hedera helix*
Celastrus scandens

Common Understory Species (3'-20') layer:

Lindera bentoin *Cornus florida*
Prunus serotina
Vaccinium corymbosum

Herbaceous Species (0-3' layer):

Lonicera japonica *Smilacina racemosa* *Quercus montana*
Celastrus scandens *Cleavers bedstraw*
Perthuisia quinquifida *Hedera helix*

Comments:

(1/100th acre plot = 11.78' radius circle)

(1/10th acre plot = 37.24' radius circle)

Forest Stand Delineation
Field Sampling Data Sheet

Property: The Reserve at Annapolis Station Prepared by: K. Wallis

Stand: A Sample Point: A Date: 5-22-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	
Qm	22, 21, 22, 7		0
Qc	21	Percent canopy cover at sample point	98
Qs	74, 25		
Lt	40	Percent herbaceous cover at 1/100th acre plot	70
Ct	19		
Ls	23	Percent downed woody debris ≥6" diameter at 1/10th acre plot	1
Ac	18		
Pa	35	Percent invasive plant cover at 1/100th acre plot	5
Cc	3		
		Number of shrubs per 1/100th acre plot	8/10

Invasive Species:

bittersweet
Lonicera japonica

Common Understory Species (3'-20') layer:

Sassafras albidum
Quercus montana
Coryna tomentosa
Vaccinium corymbosum
P.
Prunus serotina

Herbaceous Species (0-3' layer):

bittersweet
wild yam
Taxicodendron radicans
Smilacina speciosa
Parthenocissus quinquefolia
Lonicera japonica
Vaccinium vacillans
Prunus serotina
Viburnum acerifolium

Comments:

(1/100th acre plot = 11.78' radius circle)

(1/10th acre plot = 37.24' radius circle)

APPENDIX C

FOREST STAND SUMMARY

Forest Stand:	B	<u>% Dominance By Species For Stand B</u>		
Acreage:	0.46	<u>Species</u>	<u># Tallied</u>	<u>% Dominance</u>
Data Points/Stand:	2	black cherry	9	20%
Average DBH:	13	yellow-poplar	19	42%
Number of Trees/Acre:	841	sassafras	3	7%
Number of Tree Species:	7	red mulberry	2	4%
Basal Area/Acre:	225	Elm sp.	3	7%
Number of Dead Trees/Acre:	27	tree-of-heaven	8	18%
Number of Shrubs per Acre:	1350	sweetgum	1	2%
% Canopy Cover:	75	0	0	0%
% Herbaceous Cover:	45	Total	46	100%
% Downed Woody Material:	1			
% Exotic or Invasive Species:	45			

FOREST STRUCTURE ANALYSIS

(As an average per acre for the stand)

<u>Stand Designation</u>	<u>B</u>	<u>Structure Value</u>	<u>16</u>
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The following parameters comprise an average of data collected at each point for the stand indicated above. The parameters, when combined, give a general representation of the condition and value of the stand.

The total structure value is defined by:

15-21 Priority

7-14 Good

0-6 Poor

<u>Percent Canopy Closure</u>		<u>Size Class of Dominant Trees</u>	
70-100%	3	Greater than 20"	0
40-69%	0	6-19.9"	2
10-39%	0	3-5.9"	0
0-9%	0	Less than 3"	0
<u>Number of Shrubs per Acre</u>		<u>Percent Herbaceous Cover</u>	
600 or more	3	75-100%	0
400-599	0	25-74%	2
200-399	0	5-24%	0
0-199	0	0-4%	0
<u>Percent Woody Debris</u>		<u># of Tree Species >=6"</u>	
15-100%	0	6 or more	3
5-14%	0	4-5	0
1-4%	1	2-3	0
Less than 1%	0	0-1	0
<u># Standing Snags per Acre</u>			
30 or more	0		
20-29	2		
10-19	0		
0-9	0		

Forest Stand Delineation
Field Sampling Data Sheet

Property: The Reserve at Annapolis Station Prepared by: K. Wallis

Stand: B Sample Point: D Date: 5-22-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	
Usp	3, 10, 14		0
Ac	8, 5, 8, 4, 13, 13, 5, 9	Percent canopy cover at sample point	70
Lt	10, 11, 17, 16, 16, 26, 38, 30, 30, 13, 76, 16, 16		
Ls	33	Percent herbaceous cover at 1/100th acre plot	60
Ps	24, 9		
		Percent downed woody debris ≥6" diameter at 1/10th acre plot	1
		Percent invasive plant cover at 1/100th acre plot	40
		Number of shrubs per 1/100th acre plot	15+
Invasive Species: <i>Ailanthus altissima</i> <i>Rosa multiflora</i> Bittersweet			
Common Understory Species (3'-20') layer: <i>Lindera benzoin</i> <i>Acer negundo</i> <i>Ailanthus altissima</i> <i>Rosa multiflora</i>			
Herbaceous Species (0-3' layer): <i>Celestus scandens</i> <i>Rubus</i> sp. <i>Waldsteinia fraguoides</i> <i>Clematis barbatum</i> <i>Toxicodendron radicans</i>			
Comments: 			

(1/100th acre plot = 11.78' radius circle)

(1/10th acre plot = 37.24' radius circle)

Forest Stand Delineation **Field Sampling Data Sheet**

Property: Hayes Property Prepared by: K. Wallis

Stand: B Sample Point: C Date: 10-18-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	
black cherry	9 15, 8, 5, 14, 4, 2		6 22
yellow poplar	19, 23, 10, 19	Percent canopy cover at sample point	80
Sassafras	10, 14, 4		
Mulberry	8, 8	Percent herbaceous cover at 1/100th acre plot	30
		Percent downed woody debris ≥6" diameter at 1/10th acre plot	1
		Percent invasive plant cover at 1/100th acre plot	50
		Number of shrubs per 1/100th acre plot	12+

Invasive Species:

Lonicera japonica *Lonicera tatarica* *Rosa multiflora*
Rubus phoenicolasius *Acer platanoides* *Barberry* *Hedera helix*

Common Understory Species (3'-20') layer:

Acer negundo *Corya tomentos* *L. tomentos*
Lindera benzoin *Sassafras albidum* *Rosa multiflora*

Herbaceous Species (0-3' layer):

Rubus alleghaniensis *R. phoenicolasius* *Sorbaria foliosa*
Allium canadense *Tradition* *Hedera helix*
Lonicera japonica *Barberry*

Comments:

(1/100th acre plot = 11.78' radius circle)
(1/10th acre plot = 37.24' radius circle)

APPENDIX D

FOREST STAND SUMMARY

Forest Stand:	C	<u>% Dominance By Species For Stand 3</u>		
Acreage:	0.60	<u>Species</u>	<u># Talled</u>	<u>% Dominance</u>
Data Points/Stand:	2	Ar	4	19%
Average DBH:	21	Lt	12	57%
Number of Trees/Acre:	66	Ls	1	5%
Number of Tree Species:	6	Po	2	10%
Basal Area/Acre:	105	Ne	1	5%
Number of Dead Trees/Acre:	0	Ps	1	5%
Number of Shrubs per Acre:	1500	0	0	0%
% Canopy Cover:	78	Total	21	100%
% Herbaceous Cover:	65			
% Downed Woody Material:	2			
% Exotic or Invasive Species:	8			

FOREST STRUCTURE ANALYSIS

(As an average per acre for the stand)

<u>Stand Designation</u>	<u>C</u>	<u>Structure Value</u>	<u>15</u>
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The following parameters comprise an average of data collected at each point for the stand indicated above. The parameter, when combine, give a general representation of the condition and value of the stand.

The total structure value is defined by:

15-21 Priority

7-14 Good

0-6 Poor

<u>Percent Canopy Closure</u>		<u>Size Class of Dominant Trees</u>	
70-100%	3	Greater than 20"	3
40-69%	0	6-19.9"	0
10-39%	0	3-5.9"	0
0-9%	0	Less than 3"	0
<u>Number of Shrubs per Acre</u>		<u>Percent Herbaceous Cover</u>	
600 or more	3	75-100%	0
400-599	0	25-74%	2
200-399	0	5-24%	0
0-199	0	0-4%	0
<u>Percent Woody Debris</u>		<u># of Tree Species >=6"</u>	
15-100%	0	6 or more	3
5-14%	0	4-5	0
1-4%	1	2-3	0
Less than 1%	0	0-1	0
<u># Standing Snags per Acre</u>			
30 or more	0		
20-29	0		
10-19	0		
0-9	0		

Forest Stand Delineation Field Sampling Data Sheet

Property: The Reserve at Annapolis Station Prepared by: K. Wallis

Stand: C Sample Point: E Date: 6-20-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	0
Ac	16, 24, 20 , 15		
Ls	24, 17, 15, 15	Percent canopy cover at sample point	85
Pa	35, 29		
Ns	22	Percent herbaceous cover at 1/100th acre plot	70
Lt	29, 17 , 17, 27, 21, 22, 23, 18, 19		
Ps	14	Percent downed woody debris ≥6" diameter at 1/10th acre plot	3
		Percent invasive plant cover at 1/100th acre plot	10
		Number of shrubs per 1/100th acre plot	15+

Invasive Species:

Rosa multiflora
Lonicera japonica

Common Understory Species (3'-20') layer:

Rosa multiflora
Acer negundo
Lindera benzoin

Herbaceous Species (0-3' layer):

<i>Lonicera japonica</i>	<i>Simplocarpus foetidus</i>	<i>Smilax rotundifolia</i>
<i>Toxicodendron radicans</i>	<i>Waldsteinia fragillides</i>	<i>Carex acutata</i>
<i>Parthenocissus quinquefolia</i>		

Comments:

(1/100th acre plot = 11.78' radius circle)

(1/10th acre plot = 37.24' radius circle)

Forest Stand Delineation
Field Sampling Data Sheet

Property: The Reserve at Annapolis Station Prepared by: K. Wallis

Stand: C Sample Point: F Date: 6-20-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	
Ac	14, 11, 14, 10, 9		0
Lt	30, 40, 19, 23	Percent canopy cover at sample point	70
Ls	17		
		Percent herbaceous cover at 1/100th acre plot	60
		Percent downed woody debris ≥6" diameter at 1/10th acre plot	0
		Percent invasive plant cover at 1/100th acre plot	5
		Number of shrubs per 1/100th acre plot	15+
Invasive Species: <i>Lonicera japonica</i>			
Common Understory Species (3'-20') layer: <i>Lindera benzoin</i>			
Herbaceous Species (0-3' layer): <div style="display: flex; justify-content: space-between;"> <div> <i>Lonicera japonica</i> <i>Parthenocissus quinquefolia</i> <i>Symplocarpus foetidus</i> </div> <div> <i>Impatiens capensis</i> <i>Polygonum</i> sp. <i>Cinna arundinacea</i> </div> </div>			
Comments:			

(1/100th acre plot = 11.78' radius circle)

(1/10th acre plot = 37.24' radius circle)

APPENDIX E

FOREST STAND SUMMARY

Forest Stand:	D	<u>% Dominance By Species For Stand D</u>		
Acreage:	0.16	<u>Species</u>	<u># Tallied</u>	<u>% Dominance</u>
Data Points/Stand:	1	yellow-poplar	16	80%
Average DBH:	18	American beech	2	10%
Number of Trees/Acre:	145	sweetgum	1	5%
Number of Tree Species:	4	sassafras	1	5%
Basal Area/Acre:	200	0	0	0%
Number of Dead Trees/Acre:	0	Total	20	100%
Number of Shrubs per Acre:	300			
% Canopy Cover:	90			
% Herbaceous Cover:	60			
% Downed Woody Material:	1			
% Exotic or Invasive Species:	40			

FOREST STRUCTURE ANALYSIS

(As an average per acre for the stand)

<u>Stand Designation</u>	<u>D</u>	<u>Structure Value</u>	<u>11</u>
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The following parameters comprise an average of data collected at each point for the stand indicated above. The parameters, when combined, give a general representation of the condition and value of the stand.

The total structure value is defined by:

15-21 Priority

7-14 Good

0-6 Poor

<u>Percent Canopy Closure</u>		<u>Size Class of Dominant Trees</u>	
70-100%	3	Greater than 20"	0
40-69%	0	6-19.9"	2
10-39%	0	3-5.9"	0
0-9%	0	Less than 3"	0
<u>Number of Shrubs per Acre</u>		<u>Percent Herbaceous Cover</u>	
600 or more	0	75-100%	0
400-599	0	25-74%	2
200-399	1	5-24%	0
0-199	0	0-4%	0
<u>Percent Woody Debris</u>		<u># of Tree Species >=6"</u>	
15-100%	0	6 or more	0
5-14%	0	4-5	2
1-4%	1	2-3	0
Less than 1%	0	0-1	0
<u># Standing Snags per Acre</u>			
30 or more	0		
20-29	0		
10-19	0		
0-9	0		

Forest Stand Delineation
Field Sampling Data Sheet

Property: _____ Prepared by: K. Wallis

Stand: D Sample Point: 6 Date: 10-19-12

Species	Tallied DBH	Diameter of dead trees ≥6" DBH tallied at sample point	
Yellow poplar	19, 23 12, 20, 20, 20, 20, 20, 21, 15, 20, 20, 17, 21, 19, 22		
American beech	9, 13	Percent canopy cover at sample point	90
sweetgum	22		
sassafras	9	Percent herbaceous cover at 1/100th acre plot	60
		Percent downed woody debris ≥6" diameter at 1/10th acre plot	1
		Percent invasive plant cover at 1/100th acre plot	40
		Number of shrubs per 1/100th acre plot	3
Invasive Species: Oriental bittersweet <i>Lonicera japonica</i> Hedera helix			
Common Understory Species (3'-20') layer: Liriodendron Carya tomentosa			
Herbaceous Species (0-3' layer): <div style="display: flex; justify-content: space-between;"> <div> <i>Lonicera japonica</i> Oriental bittersweet Hedera helix </div> <div> <i>Ilex opaca</i> <i>Toxicodendron radicans</i> <i>Sassafras albidum</i> </div> <div> <i>Viburnum acerifolium</i> <i>Quercus alba</i> </div> </div>			
Comments:			

(1/100th acre plot = 11.78' radius circle)

(1/10th acre plot = 37.24' radius circle)